UNIT II: BASIC CONTROL

This unit covers pre-starting procedures, as well as procedures for, starting, moving the vehicle, steering, stopping, turning, exiting and securing the vehicle. Backing, parking and making turnabouts are also covered, with emphasis on the procedures and legal requirements for performing these maneuvers.

INSTRUCTIONAL OBJECTIVES

Students will know:

Pre-start Procedures

1. Procedures for outside vehicle checks

2. Procedures for entering vehicle safely

3. How to adjust seat, mirrors, safety belts and headrests

4. The importance of locking doors

5. How to store objects to avoid impeding vision or creating hazards in crash

Starting Vehicle

1. The location and function of gauges and indicators

2. The location, function and use of controls

3. Safe starting procedures

Putting Vehicle in Motion

1. The purpose of each gear and vehicle shift patterns

2. How to accelerate smoothly

Steering

1. Proper location of hands on steering column

2. The relation between steering input and vehicle direction when going forward

3. The importance of looking far ahead of the vehicle

Stopping

1. How to decelerate gradually to a controlled stop

Turning

1. The relation between steering input and rate of turn

2. There is a differential in tracking between front and rear wheels

3. Techniques to accommodate tracking differential

4. Procedures for executing turns safely

Exiting/Securing Vehicle

1. How to immobilize the vehicle

2. Direction in which to turn wheels when parked on downgrade or upgrade

3. Procedures for exiting vehicle safely

4. Importance of locking the doors

Backing

1. The relation between steering input and vehicle direction when backing

2. Laws governing backing on public roadways

3. Visual (seeing) requirements for backing

4. Procedures to be followed in backing

Turnabouts

1. The ways in which a vehicle may be turned around

2. The laws governing turning around on public roadways

3. Visual (seeing) requirements for turning a vehicle around

4. Procedures to follow for each type of turnabout

5. At least one alternative to making turnabouts on public roadways

Parking

1. The major hazard created by parking a vehicle

2. Ordinances covering parking

3. The visual (seeing) requirements for parking

4. Procedures to follow for parking

5. The major hazard created by exiting parking spaces

6. The visual requirements for exiting a parking space

7. Procedures to follow for exiting parking spaces

8. The applicability of right-of-way laws to vehicles leaving parking spaces

The entire unit may be covered strictly through presentation techniques. However, in areas where students may already possess at least some information--e.g., indicators and controls--it is best to attempt to draw this information from them (through questioning) to preclude boredom. Diagrams or other visuals should be used to illustrate front/rear wheel tracking, vehicle positioning and lane selection when covering turns (forward and backing) and parking. Diagrams are also useful in explaining turnabouts--especially when students are asked to identify potential hazards at each step of the maneuver.

Elements of the Driving Tips section of the Iowa Driver Manual--"Backing," "Parking" and "Turning Techniques"--may be assigned for home study before these content areas are addressed in class.

PRE-START PROCEDURES

A trip begins not when a driver starts the engine, but when a driver heads for the car. A driver's actions before getting into the vehicle and after entering the vehicle--but before starting--can go a long way toward determining whether or not this trip will be made in safety.

Pre-trip Inspection

As driver approaches vehicle, must make sure is nothing in or near intended path that might damage car or be damaged by car:

- Objects, such as nails that might puncture tires or branches that might kick up and damage underbody (e.g., oil pan, hoses) must be cleared away
- Must check for people--especially children--and animals that might move into path after driver enters car

To make complete pre-starting check, must make complete circuit around car.

While check should be made before every trip, is especially important to check behind car when will be backing.

- Cannot get clear view of what lies in back of car when standing at front or sides
- Low-lying objects--or children--also not visible in back from these positions or when seated in vehicle

If children or animals spotted near car during pre-start inspection, driver must keep track of their whereabouts until either children or driver have left the area.

In making inspection circuit, driver should also check for visible damage to vehicles (e.g., flat tires, cracked lights or windows, signs of major leakage of vehicle fluids).

Vehicle Entry

After completing outside vehicle check, must enter vehicle safely.

When car is parked on roadside, driver typically will enter vehicle by walking to driver door, close to traffic lane. Proximity to traffic lane places driver at risk.

Keys to reducing risk:

- keep as far away from traffic as possible
- keep time of exposure to risk at minimum.

Procedures:

1. Stand at front of car, out of traffic path, until traffic lane is clear
   - Distance from front of car to driver door is less than that from back of car to door, leaving driver to be in traffic for shorter period of time
   - By standing in front of car, driver is protected by car from errant drivers (if approaching vehicle veers, it will sideswipe car, not exposed driver)

2. Have key in hand before entering traffic lane, eliminating time lost in fumbling for keys and selecting correct key from others on keychain.

3. When traffic clear, walk quickly to door, keeping next to vehicle.

4. After unlocking door, check again for approaching traffic before opening door.

5. If still clear, open door quickly, but only as much as is needed to get into vehicle easily.

6. Shut door as soon as fully inside vehicle.

Interior Adjustments

Upon entering, driver must adjust seat and mirror positions to accommodate safe, comfortable driving.

Seat Adjustment

Most common mistake in seat adjustment: too close to wheel

- When seat too far forward, driver's elbows are pushed back to side of body and wrists are bent too far forward. This restricts arm movement.
- Driver's arms must be free (elbows away from body) to turn wheel quickly in an emergency
- Seat is too far forward if, with hands at 9 o'clock/3 o'clock position, driver is unable to run them in complete semi-circle (180°) around steering wheel in both directions.

Seat should also be far enough back to allow rapid movement of foot from accelerator to brake. When seat too close:

- must lift more of leg to switch pedals, requiring more strength and time to execute maneuver
- ankle bent back more than necessary, producing fatigue and possibly cramps on long trips.

When seat adjusted properly, right leg should be approximately 3/4 extended when foot reaches pedals.

Some seats adjust up and down as well as forward and back.

- When seat is raised, it brings body further from pedal (extending leg) but closer to wheel (bending arms back more)
- Driver must find "golden mean" between forward and back and up and down settings so that both legs and arms are properly extended

Mirror Adjustment

Mirrors are essential for drivers to be aware of what is happening behind them:

- Inside mirrors serve primarily to let drivers keep track of events in the lane directly behind them.
- Outside mirrors allow drivers to see traffic behind in adjacent lanes.

All mirrors should be adjusted only after seat adjustments have been made.

Inside Mirrors

Procedures:

1. Place mirror on "day" setting.

2. Turn mirror, right/left, so that picture in mirror is centered on center of lane directly behind vehicle.

3. Turn mirror up/down until the bottom of the rear-window frame is just visible at the bottom of the mirror (Bottom of window frame serves as a reference point, helping driver judge distances behind).

Day/Night Settings

When rearview mirrors are adjusted for "day" viewing, will be automatically properly set for night viewing:

- Night mirrors work like polarized sunglasses, reducing glare from vehicles approaches from behind
- Night mirror should be used only at night

Outside Mirrors

Adjust outside mirrors according to the following reference points:

- Left mirror should reveal left rear fender in bottom right side of image
- Right mirror should reveal right rear fender in bottom left side

Convex Mirrors

Some outside mirrors--especially right side mirrors--have convex lenses.

Convex lenses are rounded out, like shoplifting mirrors in stores:

- advantage of convex mirrors--give wider view of traffic, allowing driver to see into two lanes.
- disadvantage of convex mirrors--make vehicles appear to be further away than they really are.

Securing Occupants and Cargo

Doors

All doors should be locked before starting the vehicle

- Unlocked doors may be knocked open in a crash
- A closed door strengthens the car body, reducing risk that it will be caved in during a crash
- Closed door also reduces the chance of occupants being ejected from car body in a crash
- Safest place to be in a crash is inside the passenger compartment--strongest part of car.

Headrests

Adjust headrest so that round part of back of head lies in middle of headrest.

- Headrest keeps head from snapping back if car hit from front or rear
- If headrest set too low (below bulbous part of head), it will not prevent snap back
- Snap back is major cause of whiplash injuries

Safety Belts

Fasten safety belts properly

- Lap belt goes snugly over pelvic bones
- Shoulder belts go over collar bone and ribs and should be fit snugly but not too tight (occupants should be able to fit fist between chest and belt)

Driver must also make sure all passengers are wearing belts

Safety Belt Law

According to Iowa law, driver can be stopped and fined if anyone in front seats of vehicle is not wearing belt.

To drive safely and legally, driver is responsible for seeing that all passengers are buckled -- only one person per belt.

Benefits of Belt Use

As is the case with other traffic laws, seat belt law is designed to reduce accidents and injuries.

- Seat belts protect people using them by reducing the number and severity of injuries arising from crashes.
- Seat belts also protect occupants from each other.
- In a crash, unbelted occupants can be thrown into others with enough force to seriously injure, and even kill, them.

Belts not only protect drivers in crash but also help drivers keep from having accidents.

- Belts keep driver in position for which mirrors have been adjusted, increasing chances that driver can see danger approaching from behind.
- Belts keep driver squarely behind the wheel, where the driver needs to be to control the car. Without belt, sudden bump or swerve could pull driver from wheel, resulting in loss of control.

The importance of safety belts will be dealt with later in the course.

Cargo

Just as unbelted passengers can pose a hazard in crashes, so can unsecured objects. Virtually any object lying lose inside a car may cause injury in a crash by striking the driver or other occupant.

Improperly stored items can also block the driver's view, keeping the driver from seeing a situation that may result in a crash.

To keep risks low:

- Place all lose items in storage space provided (e.g., glove compartment, trunk) whenever possible.
- Place objects that can't fit in storage places on the rear floor, braced as firmly as possible, (front seat will shield driver).
- Never store items on the dash or rear window ledge, as they will unnecessarily obstruct view of events ahead and behind.

STARTING VEHICLE

Before getting to the procedures involved in starting the vehicle, students should be familiarized with the location and functions of indicators and controls.

Indicators

- Alternator indicator--registers either the current or voltage output of electrical system
- Oil indicator--shows when oil pressure has dropped to a dangerous level

- Water temperature indicator--shows the temperature of the water in the cooling system
- Fuel gauge--shows the level of fuel in the fuel tank
- Speedometer--shows the vehicle's rate of speed
- Odometer--shows the total mileage traveled by the vehicle. Often a trip odometer is provided to show miles traveled.

Controls

Two types of controls:

- Primary--control the motion of the vehicle
- Secondary--devices affecting the safety and comfort of the vehicle.

Secondary Controls

Secondary controls are: parking lights and headlights, emergency flashers, turn signals, windshield wipers (slow and fast settings), windshield washers, horn and environmental controls (defroster, heater, air conditioner).

Drivers must know where each of these controls are and how to operate them before driving vehicle.

- Location of controls varies from car to car. Some makes have almost all controls mounted on steering column; others locate controls elsewhere (examples: high/low beam control on floorboard or turn signal lever, horn on steering wheel or turn signal lever).
- Fumbling around to try to locate or operate controls while on the road can cost precious time and keep driver's eyes off the road (searching for control), increasing the chance of accident.

Each control device has a specific safety function and should be used for the purposes intended.

Headlights

Headlights can be set at either high or low beams.

- High beams cast light further down road by lifting the angle at which the light rays are cast out.
- The higher angle can create problems for drivers ahead of the car, "blinding" them.
- Consequently, high beams should be used only when "extra" light is needed for driver to see and there are no other drivers ahead.

High/low beam indicator serves as reminder of which setting is in use. High beam indicator light should be regarded as warning light, reminding drivers to dim (switch to low beams) when within view of traffic ahead.

Parking Lights

Parking lights allow a parked car to be seen by others:

- They draw less current than headlights.
- They are not bright enough to allow drivers to see.

Headlights should be used instead of parking lights when the engine is running and drivers want to make their car more conspicuous.

Emergency Flashers

Emergency flashers make brake lights and headlights blink simultaneously. They serve two purposes: to help other drivers see the vehicle (blinking lights attract attention better than steady lights)

- give message that the driver needs help. Emergency flashers should be used only in event of emergency--i.e., vehicle has broken down or driver has been forced to stop in a hazardous position (e.g., in traffic, where would not expect to find vehicle moving extremely slowly or stopped completely.)

Windshield Wipers

Windshield wipers and washers help drivers maintain clear view of traffic in wet driving conditions.

- Wiper speed should be adjusted to match intensity of precipitation. The harder it is raining or snowing, the faster the driver should operate the wiper.
- If set too fast, blades may smear windshield and make distracting squeaking sound.
- If set too slow, precipitation will build up on windshield, distorting driver's view.
- Washer allows driver to clear dirt, salt and mud kicked up from wet road by traffic ahead.

Primary Controls

Primary controls are: steering wheel, accelerator, brake, gear shift and ignition.

Steering Wheel

Connected to the front wheels to turn them in the (horizontal) direction of desired path:

- Manual steering is a direct mechanical connection
- Power steering uses its engine power to augment and boost the manual input

Accelerator

Controls the amount of fuel supplied to the engine to regulate speed (in any one gear)

Brakes

Controls force applied on brake drums in order to slow rotation of wheels and thereby the motion of the vehicle

- Manual--force of foot pedal actually transmitted to brake pad hydraulics by means of brake fluid.
- Power--engine power used to augment manual brake application

Gear Shift

Gear shift lever controls the drive wheels--whether or not they will turn, the direction in which they will turn and how fast they will turn. Each gear serves a different purpose:

Automatic Transmission Gears:

PARK -- Engine disconnected from drive wheels; drive wheels locked. Car will not move.

REVERSE -- Engine connected to drive wheels in a way that causes them to rotate backwards.

NEUTRAL -- Engine disconnected from power wheels, but wheels not locked. Car will not respond to accelerator, but may roll if pushed or on incline. NEUTRAL is only gear, aside from PARK, in which ignition will start.

- However, car should be started in neutral only when driver is trying to restart a stalled car while it is rolling in traffic.
- When starting parked car, driver should always use PARK.

DRIVE -- Power wheels engaged, will move vehicle forward.

- The more gas provided, the faster the wheels will turn.
- Transmission will automatically shift through the gears, moving from lower gear to higher gear at the speed where a higher gear provides maximum fuel efficiency.
- The lower the gear, the slower the wheels turn but the more power is provided to the wheels.

SECOND -- The middle drive gear of most automatic transmissions. Is used primarily on:

- Steep or long upgrades when vehicle needs more climbing power than is provided in high gear.
- Steep or long downgrades to allow engine braking to supplement foot braking.

L or FIRST -- low gear, usually used only when low speeds are essential (e.g., driving on ice). Also may be used when maximum power needed to get heavy vehicle up steep incline.

Ignition

The ignition has three positions: off, power on and start. When in "power on" position, all electric devices (e.g., lights, radio, wipers, power door locks) will operate. Engine will not start or run until ignition has been placed in start position.

Starting The Engine

1. Driver must make sure vehicle is immobilized before starting.
   - Set parking brake.
   - Place transmission in PARK. (Automatic transmission)
   - Disengage clutch and move gearshift to neutral (Manual transmission)
   - Keep clutch disengaged until engine is running (Manual Transmission)
2. Give engine fuel (procedure for most vehicles, students should refer to owners manual)
   - If cold engine, press accelerator to floor and release. This sets the automatic choke.
   - If engine warm, press accelerator no more than half way to floor.
3. Insert ignition key and turn clockwise until starter kicks in.
4. As soon as ignition "catches," release key. If starter motor starts to "squeal," driver has kept key in start position too long.
5. Check all gauges. Make sure all indicator lights are off (oil indicator and safety belt indicator will remain on briefly after ignition catches).

Cold Engine

If engine cold:

- Let vehicle idle for a full minute before moving. This allows oil to warm and thin, lubricating engine.
- Failure to allow for engine warm-up can damage engine due to inadequate lubrication and may cause car to stall (because of resistance to unlubricated moving parts) when transmission shifted to drive.

Flooded Engine

If car fails to start, the engine may be "flooded". Too much gas has been fed into the carburetor. (Overabundance of gas forces out adequate air supply, preventing combustion.)

- Press accelerator all the way to the floor and hold for three-five seconds. This should drain most of the gasoline from the carburetor.
- Then, release accelerator and try ignition again.
- If that fails, wait 5-10 minutes, giving gas chance to evaporate from carburetor. Then try ignition again.

Dead Battery

If the engine fails to turn over, the most likely cause is a dead battery.

- When battery is dead, driver will hear "click" as key reaches "start" position, but the "growl" of the starter will sound weak or not at all.
- If growl sounds weak, it will sound weaker with each attempt to start the engine.
- If weakening persists after three attempts, and there is no indication that engine is trying to "catch," driver should cease trying to start engine, as he or she will only run down the battery further.

If faced with a dead battery, driver must either replace battery or--if some life left--use jumper cables.

PUTTING VEHICLE IN MOTION

Shifting Gears

Once vehicle has started:

1. Apply brake with right foot. This will allow driver to shift into the desired gear (DRIVE) without engaging REVERSE along the way, causing the vehicle to move.

2. Shift to DRIVE

3. With right foot still on brake, release parking brake.

4. When ready to move, place right foot on accelerator and press down slowly. (Automatic transmis sion)

Accelerating

The accelerator controls how much gas is fed into the engine.

- The deeper the driver presses the pedal, the more gas goes into the engine.

Increase the flow of gas evenly, until car reaches desired speed, by gradually increasing pressure on accelerator with the ball of the foot (i.e., the driver should not be driving flat footed).

STEERING

Hand Position

Hands should be placed at the 3 o'clock and 9 o'clock position:

- Only when hands in these positions can driver turn wheel a full 180° in either direction.
- Though seldom needed, such radical steering movements are necessary to execute an emergency turn.

Emergency turns are made only when driver is faced with a completely unexpected hazard immediately in front of vehicle. If hands not already in proper position, will not be time to get them to 3 o'clock/9 o'clock positions and still avoid hitting obstacle.

Turning The Wheel

There is always some "play" in a steering wheel

- Wheel can be turned slightly in one direction or the other without moving the wheels, hence, changing direction.
- Vehicles with rack-and-pinion steering tend to have less "play" than vehicles with power steering.
- When there is less play (i.e., steering is "tighter"), vehicle will respond by changing direction with smaller movements of the steering wheel.

Steering "Feel"

- Gauging the amount of wheel turn needed to make a particular path is a matter of "feel"
- Driver can get "feel" for steering of each vehicle only by driving the vehicle.
- It is important to drive slowly and with extra caution until driver gets used to vehicle responsiveness to steering input.

Maintaining a Path

Driver will need to steer vehicle all the time while driving.

- Travel paths change direction
- Bumps in roadway, angle of pavement can all push car off straight path.
- Steering a straight path requires constant slight movement of the steering wheel.
- With practice, these constant small steering adjustments will be made almost unconsciously.

The key to making these adjustments properly and maintaining a straight course lies more in the driver's eyes than hands. The most common error among young drivers in this regard is to concentrate their eyes on the road just a few feet in front of the hood.

- Looking "low" limits range of view and leads to in-lane weaving.

- Drivers need to look far ahead of the vehicle, giving them a wider perspective of their location within the road.
- Looking far ahead reduces the tendency to oversteer among inexperienced drivers.

STOPPING

In bringing a vehicle to a halt, the goal is to come to a gradual, controlled stop. Sudden stops not only jolt occupants, but also cause unnecessary wear to the brakes.

- The key to efficient stopping is to look far ahead and begin decelerating early.
- Begin decelerating by easing up on the accelerator.
- Then use the brake, beginning with only slight pressure.
- Increase pressure on brake slowly and steadily.
- Clutch must be disengaged just prior to stop to keep vehicle from stalling. When vehicle is stopped or nearly stopped driver must shift back to first gear (manual transmission).
- Easing up on brake just before coming to a stop will prevent "lurching."

Once driver has come to complete stop, must keep brake fully applied until time to accelerate again.

- Car can be kept in gear so driver can drive quickly away from approaching danger (e.g., car approaching from behind too fast to stop in time).
- As long as foot is on brake pedal, brake lights will be lit, signaling drivers approaching from behind that vehicle is stopped.

SECURING VEHICLE

At completion of trip, driver must take steps to assure that vehicle is secure:

- Shift to PARK (second gear, if manual transmission)
- Set parking brake
- Remove key from ignition

Parking on Grades

Downgrades

If parked on downgrade, turn wheels toward curb. If car starts to roll, it will be stopped by curb rather than roll straight ahead or out into traffic.

Upgrades

If parked on upgrade, turn wheels away from curb. If car starts to roll, it will stop on curb rather than roll straight back or out into traffic.

EXITING VEHICLE

Driver must exercise caution in exiting vehicle.

- Check left side mirror for gap in traffic.

- Make head check to verify gap before opening door.
- When sure traffic lane is clear, crack door open and press door lock.
- Make final visual check, exit vehicle and shut door in locked position.
- Walk next to car until completely out of roadway.

TURNING

A turn is any change in direction. This definition includes changing lanes as well as taking corners.

Steering

- When changing lanes or taking curves, hands should remain at 3 o'clock/9 o'clock position.
- For cornering maneuver, however, will have to turn steering wheel more severely, necessitating hand-over-hand action.
- Straighten the car as soon as the turn has been completed.

Lane Use

To execute a corner safely, drivers must both begin and end the maneuver in the appropriate lane. On streets with two or more lanes of traffic going in the driver's direction, the driver should:

- Begin the turn from the lane closest to the direction in which the turn will be made.
- End the turn in the nearest lane in the direction the vehicle will be driving.

The purpose of these lane usage rules is to reduce conflicts in traffic. Unless somehow told otherwise (e.g., through turn signals), drivers expect other drivers to keep going in the direction they are headed.

- A driver turning left from a right hand lane is making a totally unexpected move. So is a driver turning right from a left hand lane.
- In making these illegal maneuvers, driver risks cutting off a vehicle in the other lane.
- Not expecting this move, the cut-off driver may not be able to avoid hitting the turning driver or may react by cutting quickly into another lane, hitting someone else.

Speed

The other key to making a safe turn is for the driver to control the vehicle's speed. The momentum of a moving car forces it straight ahead.

- When executing a turn, the only thing forcing the car to change direction is the front tires.
- The faster the car is going (the greater the forward momentum), the harder it is for tires to force the car into a turn. Consequently, turning radius increases with speed.
- Driver must slow the car sufficiently before starting to turn, to a speed that will allow the tires to complete the front turn without straying out of the appropriate turning lane.

BACKING

Safe backing requires proper seeing, speed and steering.

Seeing

To back safely, driver must be able to see where going. The only way to get a good view of the area behind the car is to turn around and look at it. To get proper view, driver must:

- Place left hand at 12 o'clock on steering wheel
- Place right hand over back of passenger seat
- Twist body to the right and turn head so eyes can look straight through rear window.

Speed

Backing is more difficult than going forward, so it is essential to back slowly. This gives driver more time to correct vehicle drift.

- For cars with automatic transmissions, drivers usually will not need to use the accelerator, as the car will back at idle speed.
- If it is not necessary to use the accelerator, driver should use foot to cover the brake.

Steering

Often, when backing, the car will begin to drift (move off the path the driver wishes it to take). Only a slight movement of the steering wheel is necessary to restore vehicle to intended path. After correcting for drift, driver should always return wheel to 12 o'clock position.

When steering in reverse, the car will turn in the same direction as the steering wheel.

- To back left, turn top of steering wheel left.
- To back right, turn top of steering wheel right.

Backing Procedures

1. Make sure the car is at a complete stop (shifting into reverse while car is moving may damage transmission)

2. Keep foot on brake while shifting to **REVERSE**

3. Put left hand at 12 o'clock and right hand over back of seat. Look directly through rear window

4. Remove foot from brake. Use accelerator, if necessary. Otherwise, keep foot covering brake.

5. Back slowly, correcting drift with slight movement of steering wheel.

6. Come to complete stop.

7. With foot still on brake, shift to **DRIVE.** (Automatic transmission) or first gear (Manual transmission)

Turning While Backing

Backing becomes even more difficult when the driver must turn the vehicle in the course of backing.

- Backing in a turn is more demanding because front wheels will track outside the rear wheels. This means that, when the car's rear goes one way, the front end swings out in the other direction.

- Backing in a turn is more demanding because front wheels will track outside the rear wheels. This means that, when the car's rear goes one way, the front end swings out in the other direction.

- The sharper the turn, the further outside the front wheels will track. Thus, drivers must keep an eye on the front fender opposite the direction in which they are backing, to avoid having the fender swing out and hit something (another car, a tree).

Practices

Because drivers physically cannot keep one eye on the intended path and the other on the opposite front fender, they must:

- Stop from time to time to check the position of the front fender.

- To allow maximum clearance, try to position the car as far as possible to the side of the lane that matches the direction they will be turning (i.e., start from left side of lane when backing left).

- Turn the wheel slowly, one can always turn the wheel faster if the car is not turning quickly enough.

- If the car starts turning too sharply, countersteer (turn wheel in opposite direction).

- If backing slowly enough, only minor adjustments (countersteering) will be necessary to interrupt the larger steering into the turn.

Body position is also critical to allowing drivers a clear view of the path.

- Assume the same body position as is used for backing straight when making right hand turns.

- For left hand turns, place left hand over back of driver seat and right hand at 12 o'clock position on wheel.

Procedures

1. Position vehicle on side of lane closest to direction in which driver wishes to turn

2. Turn body in direction that gives fullest view of vehicle path

3. Turn steering wheel in direction of desired turn

4. As vehicle turns, make frequent check of opposite side front fender for clearance

5. Keep vehicle speed low to allow plenty of time for counter steering and minor vehicle-drift corrections

If backing into traffic, must be sure to stop car before any part of vehicle enters the roadway. Driver can then check for approaching traffic without having any part of vehicle exposed.

TURNABOUTS

Sometimes drivers will be proceeding in one direction and determine they should be going in the opposite direction. This usually happens when drivers realize they have missed a turn.

Types of Turnabouts

There are three basic maneuvers for making a turnabout:

1. U-turn -- Car makes a "hard" left turn of 180°. Since this turn is made in one movement, it requires either a very wide road or a car with a very small turning radius.

2. Three-point turn (K-turn) -- This maneuver consists of a hard left turn, followed by a backing right turn and completed by shifting to drive and straightening out.

- It allows vehicles to turn about on roads not wide enough to accommodate a U-turn.
- It is the most dangerous turnabout maneuver because it takes more time to execute than a U-turn, requiring an extra wide gap in traffic in both lanes.
- Additionally, the car is exposed to the prospect of head-on collisions in both lanes during the course of the maneuver.

3. Two-point turnabout -- a maneuver in which the driver uses a side street to change directions. Can be accomplished in one of two ways:

- turn right into side street, back left into desired lane and pull forward
- pull past side street, back right into side street, then forward, turning left.

Restrictions

All turnabouts are inherently dangerous because they expose drivers to traffic from opposing directions for relatively long periods of time. At many locations, it is illegal to make a turnabout.

- Emergency vehicle turn lane on interstates cannot be used -- Slow moving vehicle, unequipped with emergency vehicle lights, is at too great a risk of crash coming on to high speed lane.
- Other locations may have signs specifically prohibiting turnabouts--no U-turn signs or other regulatory signs expressly forbidding the use of streets or driveways for turnabouts.

Purpose for restrictions:

- Heavy traffic is usually present, making the likelihood of finding a gap big enough to turn safely very small.
- Prior accident experience -- repeated crashes at that location may have resulted from people trying to make turnabouts.
- Line of sight --a restricted line of sight that makes it impossible for drivers to tell if traffic is approaching.
- Prevailing traffic speeds--too fast for driver making turn to be able to match the speed of other vehicles.

Turnabouts are permissible where laws or signs do not expressly forbid the practice, providing the traffic flow and line of sight permits accurate assessment of risk. Drivers attempting a turnabout at unregulated locations who cause a crash may be ticketed for failure to exercise due caution.

The key to executing turnabouts safely is good visual habits. Drivers must search for traffic in both directions.

U-turn procedures:

- Move car to extreme right of lane.
- Signal left hand turn.
- Check traffic ahead and behind (use rearview mirror, left side mirror and head check) until have spotted large enough gap
- Turn left quickly (hand over hand, using full width of roadway to allow for quickest possible turn)
- Straighten car and accelerate to match speed of traffic.

Procedures for Three-point Turn:

- Position car to far right of roadway
- Signal left turn
- Scan for appropriate gap in traffic, as per U-turn
- When large enough gap available, turn left as sharply as possible, stopping vehicle just before front wheels reach edge of pavement.
- Turn steering wheel sharply right
- Shift to **REVERSE**
- Verify that traffic is still absent from lane to be entered, and back--turning right--using over-the-shoulder check, as per usual in backing
- When car has backed to point where can pull into desired lane, come to complete stop and shift to **DRIVE**
- Use over-the-shoulder check (right) to verify gap in right hand lane while straightening wheels
- Pull quickly into desired lane, steering slightly left until car is straight in lane, then straighten wheels.

Procedures for Two-point Turn, Forward

- Signal and make right hand turn, stopping as soon as rear of car is out of lane of traffic
- Shift to **REVERSE**
- Turning body--first left, then right--check traffic in both directions until suitable gap is identified
- Turn body left once more to verify gap still there
- Back left into desired lane
- Shift to **DRIVE**, (Automatic transmission) or first gear (manual transmission) and accelerate to match flow

Procedures for Two-point Turn, Backwards

- Stop car as soon as rear of vehicle clears turning lane (e.g., alley
- Shift to **REVERSE** and signal right hand turn
- Check adjacent left hand lane to make sure there will be enough room to back without left front fender interfering with traffic
- Turn body to right and back, turning right, into alley
- Shift to **DRIVE**, (Automatic transmission) or first great (Manual transmission) signal left turn and check traffic (right, then left, then right again) to verify adequate gap
- When gap available, proceed with normal left turn procedure

General Principles for Turnabout

1. Avoid blocking lanes.
   - Driver should not attempt a turnabout if traffic will back up behind them.
   - Drivers in back will try to use any gap in approaching traffic to try to pass drivers stopping or slowing for turnabout.
   - Often this situation will lead to a collision -- a passing driver hitting a turning driver.

2. Avoid interference--Turning drivers should never attempt to enter a lane under the assumption that others will stop or slow for them.
   - It is never safe for a driver to assume that others on the road even see them.
   - Since turnabouts are relatively rare, other drivers do not expect the maneuver.
   - Other drivers may see a driver making a turnabout but not recognize what the driver is trying to do.

3. Maximize visibility--If it is necessary to make a turnabout, driver should select the maneuver that offers the best visual field.
   - The longer a maneuver takes, the larger visual field is required to execute the turnabout safely. Typically, a U-turn requires less time than a two-point turn; a two-point turn requires less time than a three-point turn.
   - Whatever the turnabout maneuver chosen, the driver must have a full view of where he or she is going -- all the lanes the driver will be using. Hence, turnabouts should never be attempted near curves or hilltops where approaching traffic may be out of sight.
   - Two-point turns should not be attempted unless the side street used provides a clear view of traffic in both directions on the main street.
   - The backing maneuvers used in two-point turns place the greatest burden on drivers to maintain an adequate field of vision.

4. Avoid making turnabouts in heavy traffic:
   - It is almost impossible to find an adequate gap for any turnabout maneuver when traffic is heavy.

- Drivers will end up saving time and lowering their risks by using an alternative to turnabouts.

Alternative To Turnabouts

The safest way to change direction is to go around the block.

- Right turns are inherently safer than left turns (driver does not need to cross one lane of traffic before entering the turn lane),
- The best alternative is to circle back to the place the driver wants to go by a route that requires only a series of right turns.

Parking

The three basic types of parking maneuvers are:

- Parallel parking--backing into a parking space with the car body ending up parallel to the curb
- Angular parking--pulling into a parking space marked by lines at approximately a 45° angle with the roadway
- Perpendicular parking--pulling into a parking space marked by lines at a 90° angle to the lane of traffic

Of these three types of parking maneuvers, angular parking is the easiest. Parallel parking is the most difficult because it involves backing.

Hazards to Parking Maneuvers

The major hazard presented by all parking maneuvers is that drivers behind the parker do not expect the parker to slow or stop.

- The best way to reduce this hazard is for the driver to give plenty of warning to those behind of the driver's intentions.
- Signal well in advance of initiating the parking maneuver.

Sometimes drivers behind will mistake a right turn signal for a parallel parking maneuver as a sign that the parker wants to make a right hand turn ahead and may stop behind the parker so close as to deny access to the parking space.

- The parking driver should pull forward and look for another space.

Drivers behind may mistake the brake lights as an indication that the parker is slowing for a turn further ahead and might ride up on the parker's tail before realizing the true intention.

When backing into a parallel parking space, the left front end may swing into the adjacent (traffic) lane, presenting a chance of a collision.

Front end swing also may be a problem in angular or perpendicular parking, given the close quarters involved. Drivers must time the turn so as to keep the outside tracking front tires from swinging the front fender into a parked car, while maintaining enough clearance between the inside tracking rear wheels and a car on the other side.

Visual Checks

Before starting any parking maneuver, driver must make a series of visual checks.

When *parallel parking*, driver must look:

- Back--to verify there is adequate space behind vehicle to enter parking spot
- Left--to verify there is adequate space to accommodate left front fender swing out
- Left side mirror/head check--to verify that no car from behind is attempting to pass.

Visual checks for both ***angular*** and ***perpendicular*** parking are identical:

- Ahead--for approaching vehicles or pedestrians that may enter gap the driver needs to make turn
- Side mirror/head check--to verify that pedestrians or other vehicles approaching from behind will not enter gap needed to complete turn
- Parking slot--to make sure that car from opposite slot has not pulled through to park in space driver had wanted.

Parallel Parking Procedures

1. Activate right turn signal as soon as possible

2. If being followed, tap brake to flash lights as an extra warning of intent

3. Stop car with back end even with back of vehicle in front of parking spot, with approximately 18" of space between the vehicles

4. Shift to **REVERSE**, and check for left front fender clearance and clearance behind

5. Back slowly, turning steering wheel to the right so as to aim back of car toward the front of the car parked behind the slot

6. As front wheels come even with rear wheels of car parked ahead, begin to straighten steering wheel

7. When right front fender clears rear of car ahead, turn steering wheel sharply left while continuing to back *slowly*

8. Continue backing until car almost touches vehicle behind (if space is large enough, driver may have to straighten wheels earlier to keep back end from heading out into traffic lane)

9. Straighten wheels shift to **DRIVE** and pull forward until car is centered in parking space.

10. Put car in **PARK** (automatic transmission) or second gear (manual transmission) and set brake

Angular and Perpendicular Parking Procedures

1. Signal the turn early

2. Check for traffic ahead and behind that might cross path when turning into space

3. Pull slowly into space, trying to have front fender on side opposite that of turn pass within inches of rear bumper of vehicle on that side (this will help maintain clearance for rear wheels on other side of parking vehicle).

4. Center car in parking space, left and right.

5. Pull all the way into the space, making sure front fender does not cross end line

When ***perpendicular*** parking in shopping centers, pull through to "front" space, if it is empty. This will allow the driver to leave spot by going forward, eliminating the more difficult maneuver of backing out of the space.

Exiting Parking Slots

In general, it is more dangerous to leave a parking space than to get into it.

Dangers in Exiting:

- Parking slots usually afford drivers only a limited field of vision. In a parallel parking spot, the vehicle in the spot behind may restrict the driver's view of the adjacent traffic lane.
- especially problematic when the vehicle behind has a solid body (e.g., truck or van) and extends further toward the adjacent lane than the driver's vehicle. Such a situation limits driver's ability to see into lane. Vehicles on either side of head-in parking slot pose the same problem.
- lack of alertness on the part of drivers in traffic. They tend to concentrate on other vehicles in traffic and may not notice the light (brake, backup or turn signals) of vehicles about to leave parking spots.

Visual Checks

To exit parking spots safely, drivers must look in the appropriate directions before moving.

- Before leaving parallel parking spot, must check adjacent traffic lane by looking at side mirror and adding head check to verify that appropriate gap exists.
- For angular and perpendicular parking, must check for traffic in both directions behind -- even if traffic is supposed to be going only one way. (People often ignore one way directions in parking lots.)
- When backing out of head-in parking spots, driver must turn body to get clear view
- If solid body vehicles prevent clear view, passenger could direct traffic, allowing safe exit.

Exiting Parallel Parking Space

1. Shift to **REVERSE** and back car straight until just shy of vehicle in spot behind.

2. Shift to **DRIVE** and activate left turn signal

3. Turn steering wheel left (turned tires give approaching drivers a clue that vehicle may enter roadway)

4. Check adjacent traffic lane for approaching vehicles, using left side mirror

5. When appropriate gap identified, verify gap with head check.

6. Enter gap slowly, checking for clearance between right front fender and parked vehicle ahead.

7. After entering traffic lane, countersteer (to right) to align vehicle in lane, then straighten steering wheel and accelerate to speed of traffic.

Backing From Head-in Parking Slots

1. Shift to **REVERSE**

2. If backing, turning right, turn body to right and check for traffic approaching from right and cars backing from slots behind

3. Turn body to left and check for approaching vehicles and cars backing from behind

4. Turn right and check to make sure gap still exists.

5. Back slowly. Do not turn steering wheel until rear tires have passed back bumper of car parked on right

6. Begin turning wheel, checking left front fender for clearance. (NOTE: when leaving angular parking spot, may be no need to turn wheel if car parked with tires at angle used to enter space.)

7. When left front fender has cleared parked car, straighten steering wheel

8. Shift to **DRIVE,** (automatic transmission) or first gear (manual transmission) and proceed.

Legal Requirements Pertaining To Parking

- Cars attempting to leave any parking slot must yield to vehicles already in the traffic lane.
- Drivers also are legally required to signal their intentions to park (change directions) by using turn signals.
- When parallel parked, vehicle wheels must end up no more than 18" from curb
- In marked parking slots, cars must be completely within the space markings for that slot
- Posted restrictions for use of parking slots (i.e., handicapped parking only, compact cars only) must be obeyed
- Vehicles may not be parked on a crosswalk, in an intersection, on a sidewalk or in front of a public or private driveway.
- Vehicles may not park on a bridge outside city limits or in tunnels
- Vehicles may not be parked any closer than: 5 feet from a fire hydrant, 10 feet from a stop sign, 20 feet from a fire station entrance, 50 feet from a railroad crossing, hotel or theater entrance.
- Vehicles may not occupy "no parking zones" -- usually marked with signs or yellow paint on curbs
- Drivers may not double park -- leave vehicle in traffic lane along side another stopped or parked vehicle.